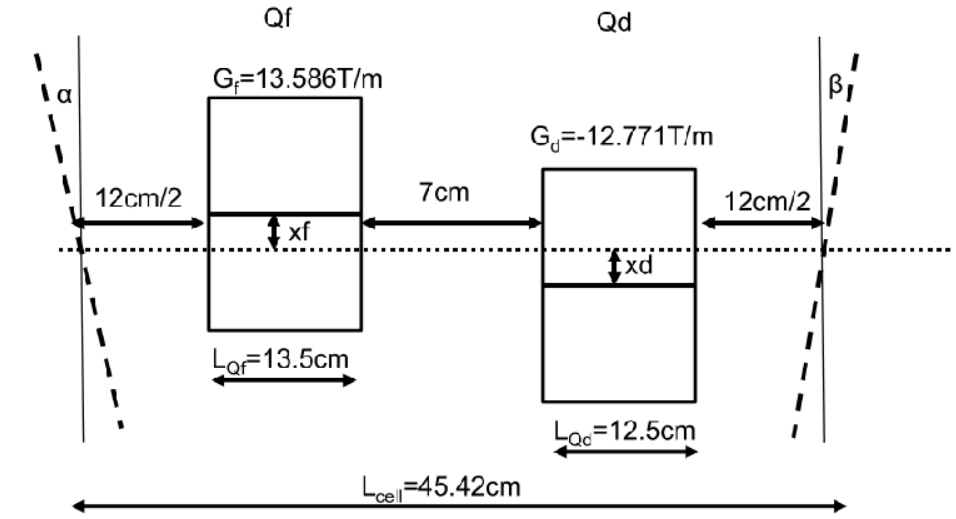
FFAG Arc Field Map Status



xf = -4.641mm
xd = 17.286mm

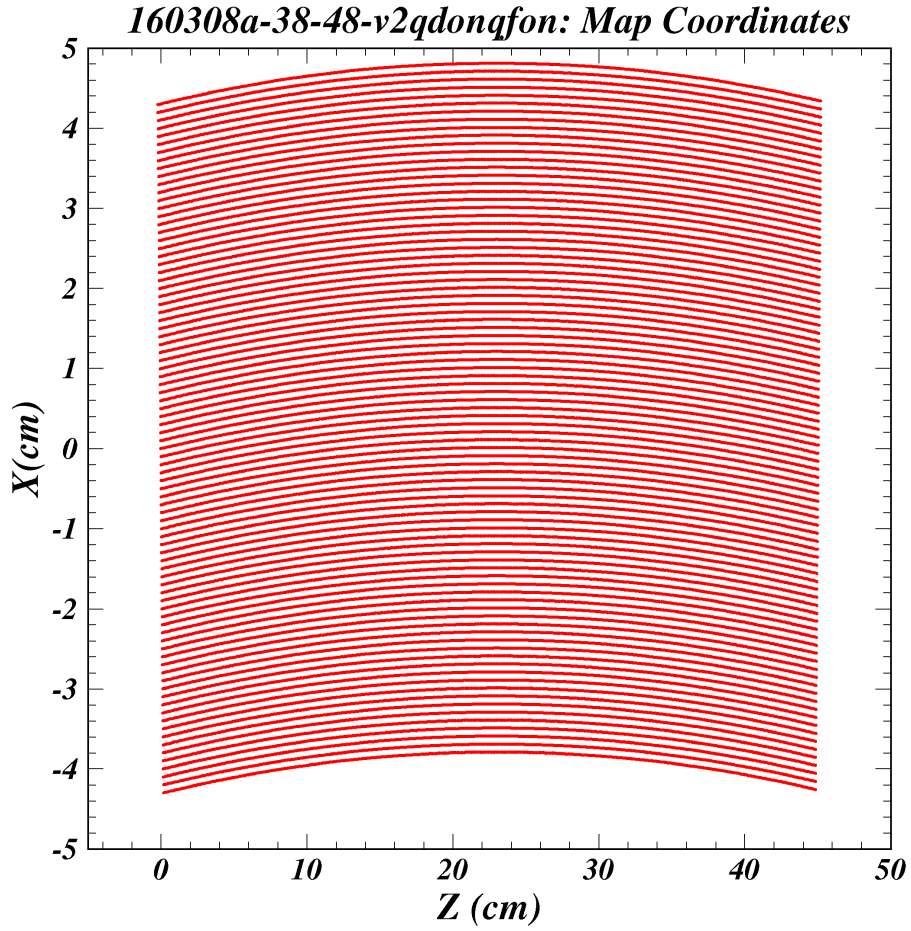
Rotations:
Qf: 1.1388°
Qd: -1.0833°
α: 2.556°
B: -2.444°

Jim Crittenden

Cbeta Collaboration Meeting

BNL, 5 May 2016

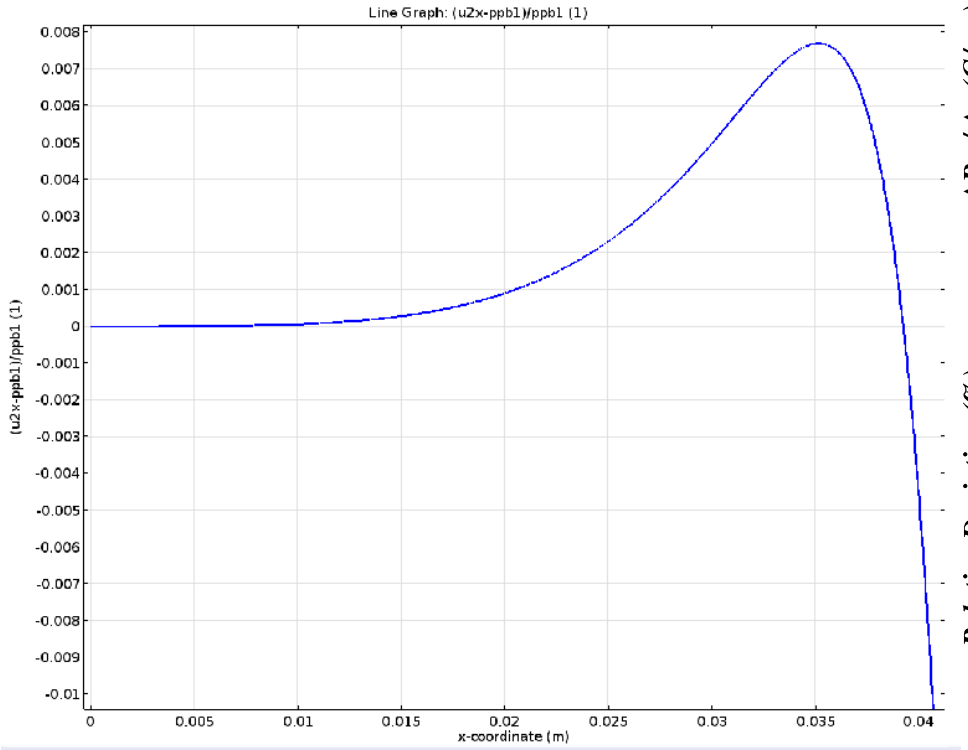
Berg-Witte Iterative Field Maps (BWIFMs)

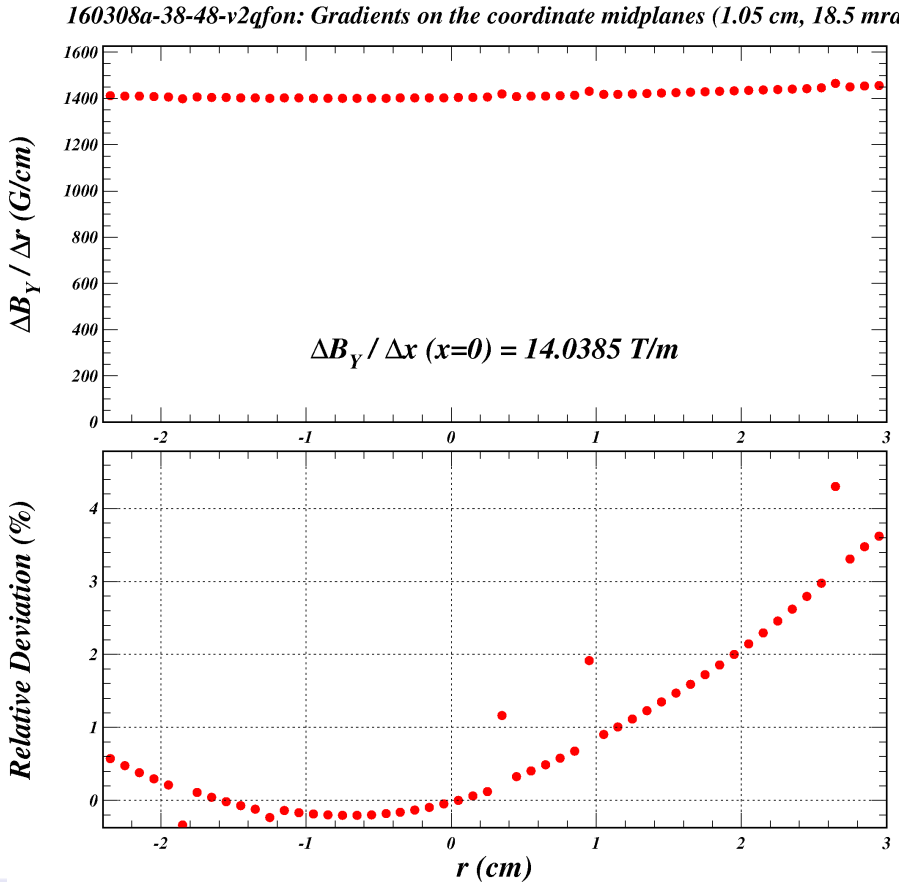


The use of curvilinear map points in a Cartesian coordinate system presents a challenge when assessing the quality of the maps

Good-field region in situ for Qf

2D gradient uniformity

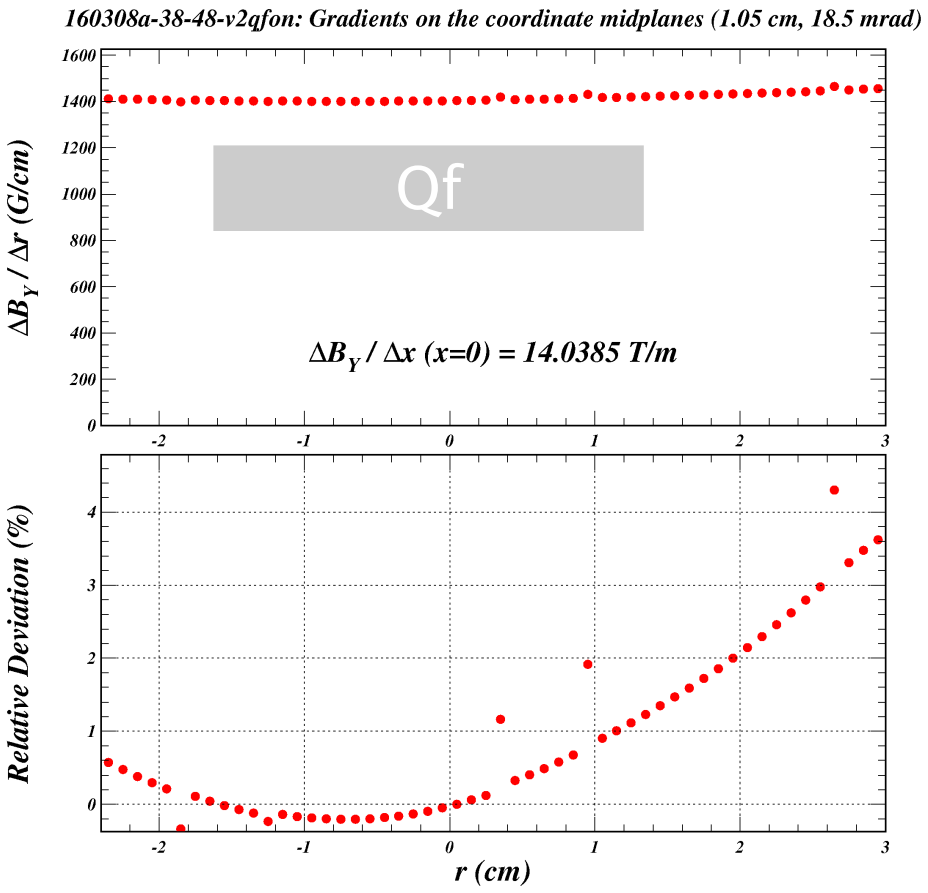


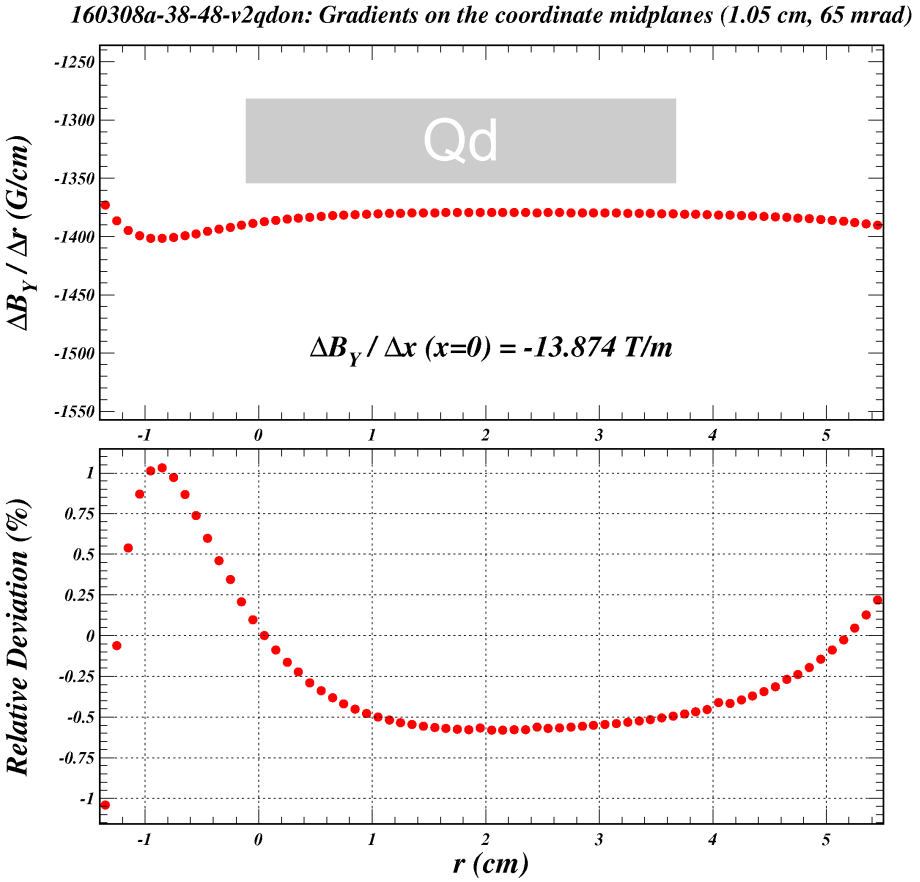


The shape of the good-field region in situ is quite different.

The extent is slightly smaller. NB: Field calculaton accuracy excellent.

Good-field region in situ: compare Qf with Qd

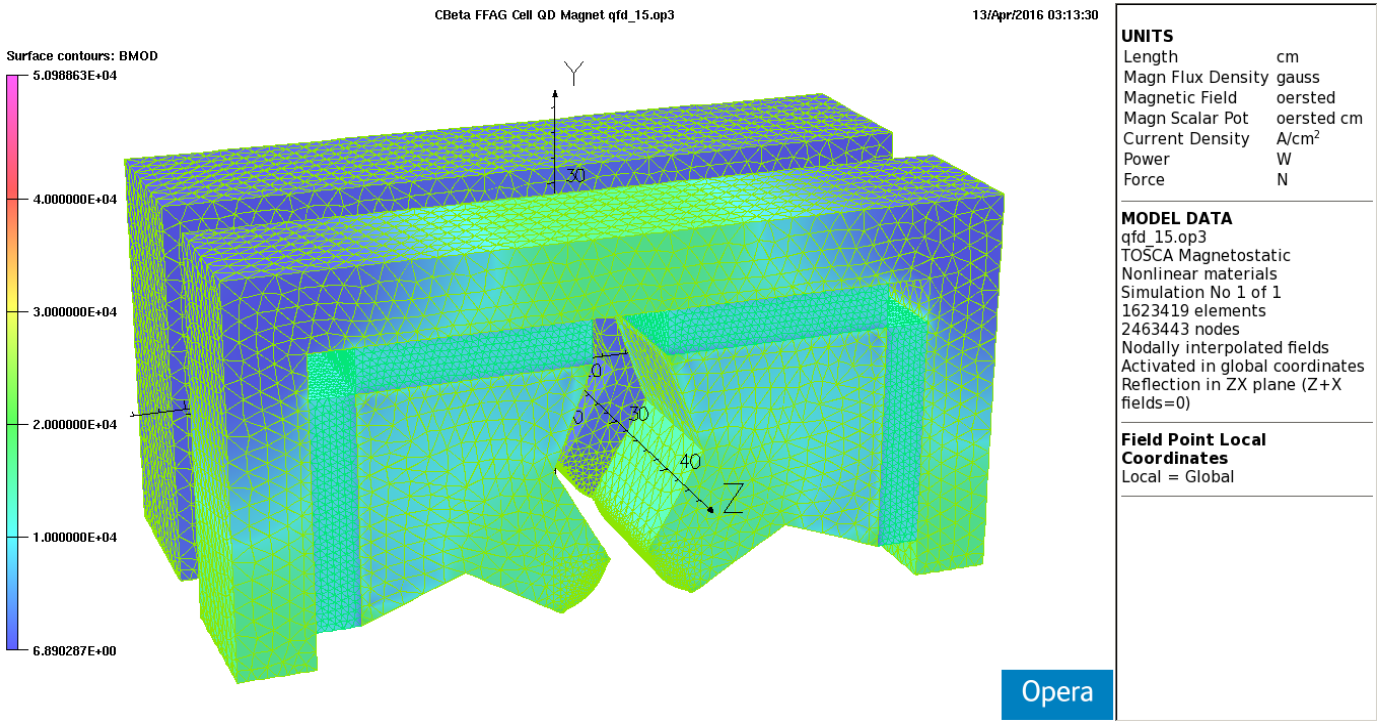




The shape of the good-field region in situ is for Qd is quite different than Qf.

The region of <+-1% is now > 6 cm (!)

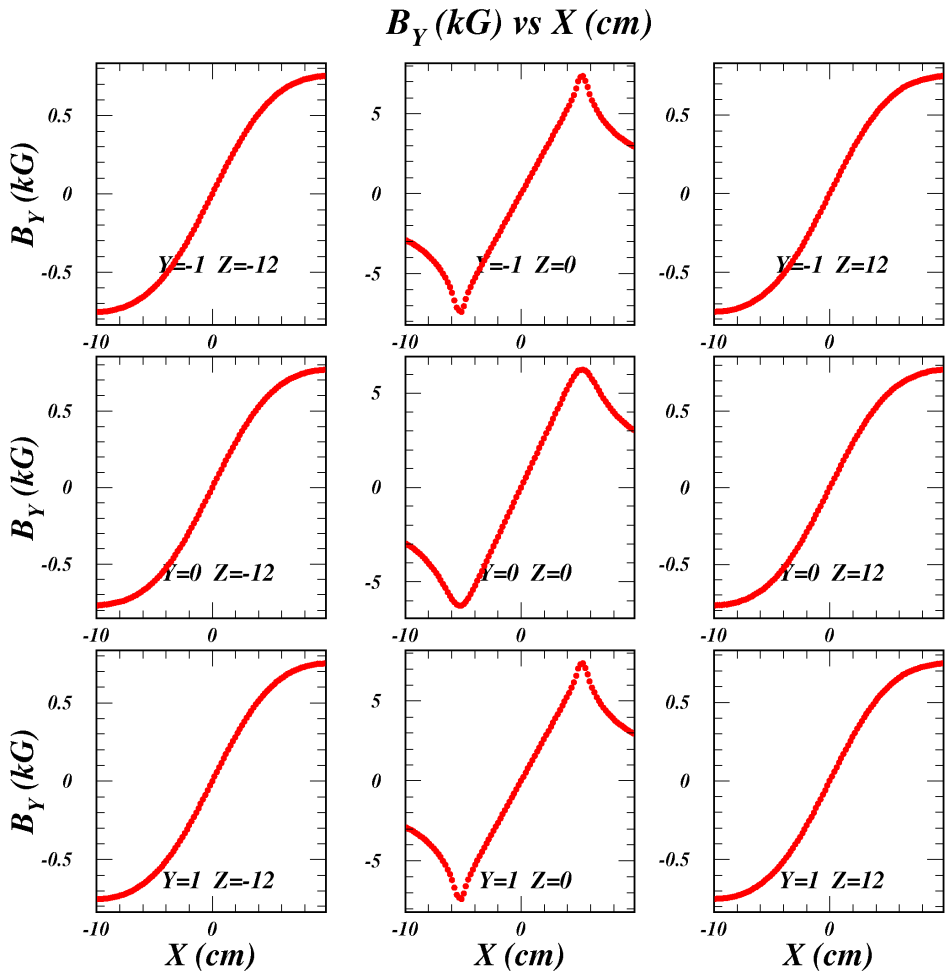
OPERA 3D Model Development at Cornell

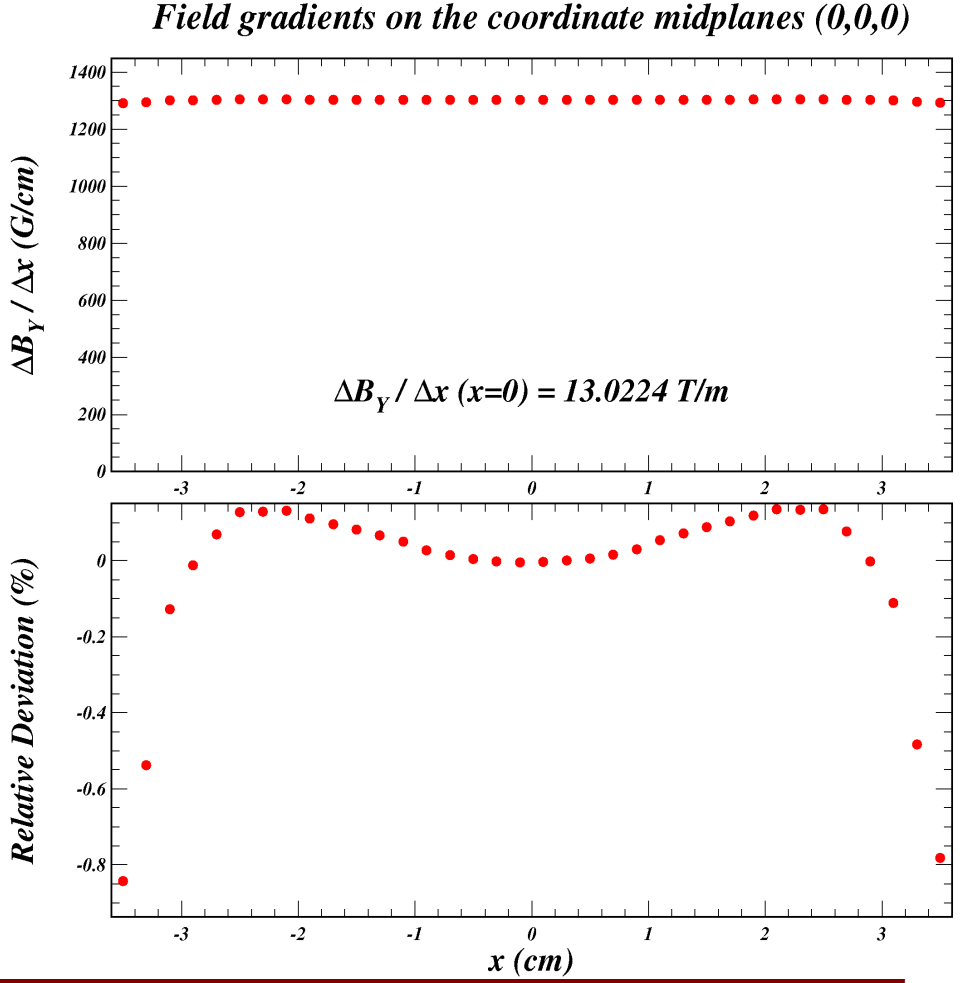


Geometry and BH data for JFE steel provded by Holger.
Half-volume geometry with no L/R asymmetries allows estimate of numerical accuracy.

QD magnet with QF steel turned off

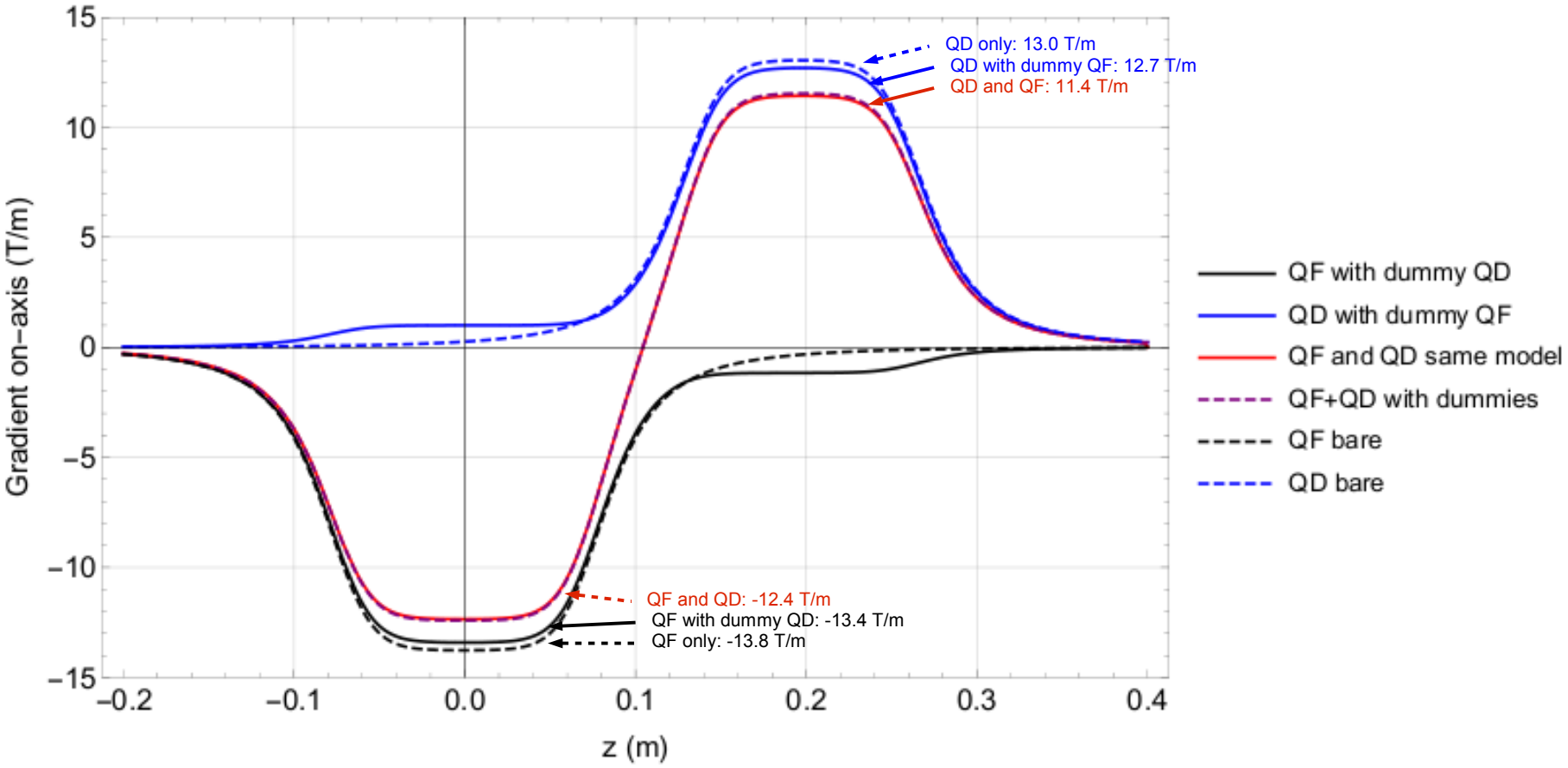
(QF 13.69 cm long, QD 11.76 cm long, separation 7 cm, no rotation)





Gradient uniformity better than 1% over ± 3.6 cm (HW design of March 2016).

Crosstalk effects on field gradients (Chris' analysis of my field tables)

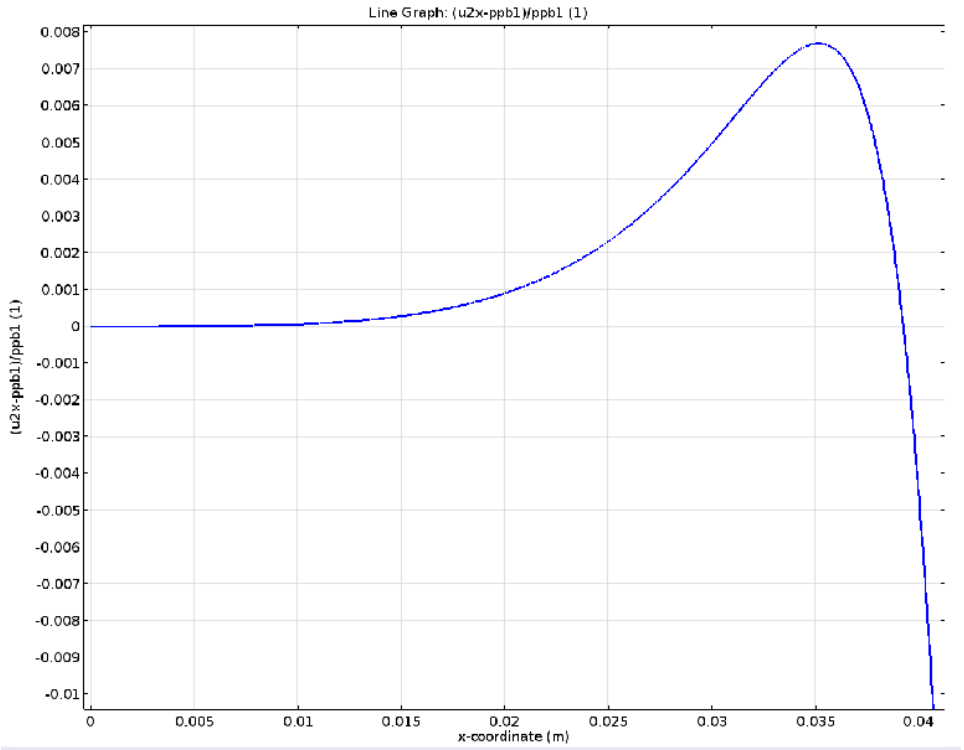


Nearby magnet reduces field gradient at 2-3% (11-14%) level if its PMs are off (on).

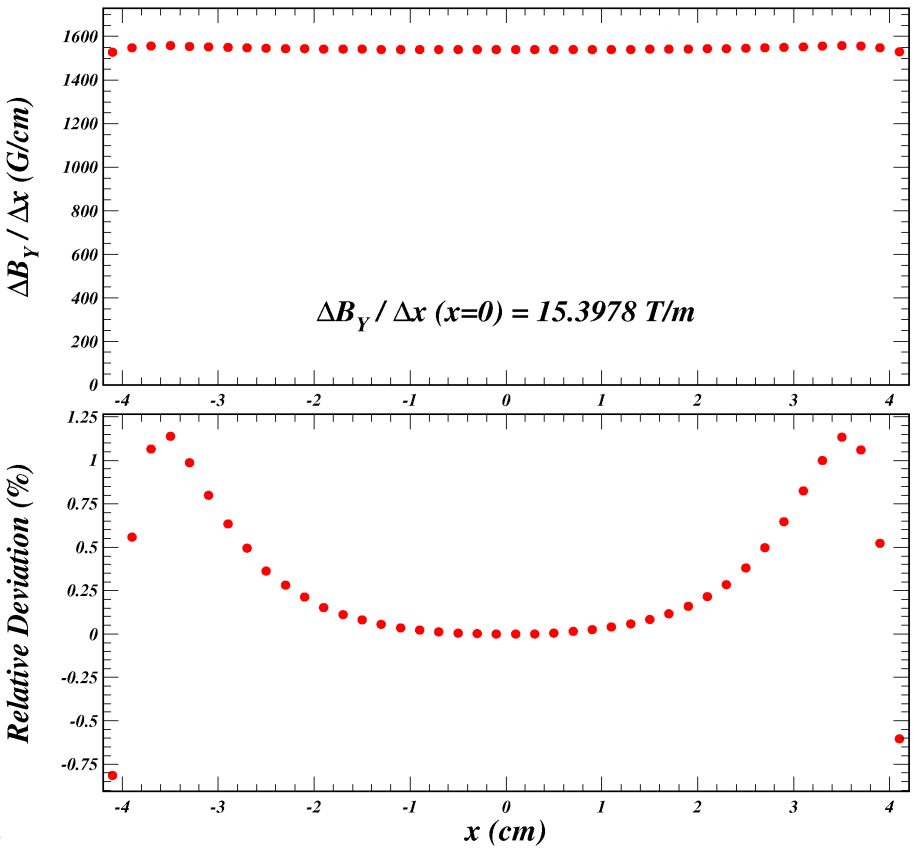
Sum of separate maps with dummies coincides well with combined map.

Recent improved pole/high gradient design

2D gradient uniformity



Field gradients on the coordinate midplanes (0,0,0)



Longer convergence required re-tuning the mesh.
Still very slow, indicating mesh too coarse in saturation regions.
But calculation accuracy good and reproduces HW 2D model well.